

Special Issue on Duct Sealing

See Page 4

**Title 24 Training
now available:**

See page 3 for Videos online

See page 7 for Training by Utilities

QUESTIONS and ANSWERS

RESIDENTIAL



What are the Title 24 requirements related to changing out my split system HVAC equipment at my house?

The *Residential Manual*, Chapter 7, page 7-27 explains the requirements. See the text preceding Example 7-17 under the heading, "New Space Conditioning Equipment." New heating and/or air conditioning systems installed in existing buildings are considered alterations. The appliance standards regulate the efficiency of new residential heating and air conditioning equipment at the point of sale. However, the mandatory requirements for low-rise residential buildings also apply. In particular, Section 150(h) requires that systems be appropriately sized and Section 150(i) requires that the new systems have setback thermostats (see the *Residential Manual*, Section 2.5.3). The prescriptive requirements of Section 151(f) 7 specify that new split system air conditioners or heat pumps installed in alterations must either be:

- verified by a HERS rater to have a thermostatic expansion valve (TXV), or
- diagnostically tested by a HERS rater to verify the correct refrigerant charge and airflow

As an alternative to TXV or the requirements for field verification and diagnostic testing for refrigerant charge and airflow measurement, an air conditioner or heat pump with a SEER of 12 or greater may be installed. The Package D requirement for diagnostic testing of ducts does not apply to alterations.

...continued on page 2

QUESTIONS and ANSWERS

RESIDENTIAL (continued)



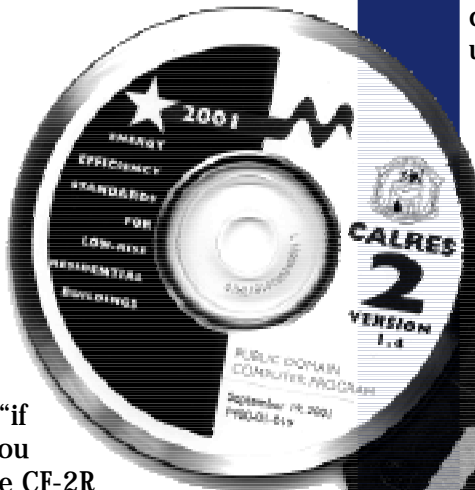
Do I need to run a calculation before I can get a complete printout from CALRES2, version 1.4?



Yes. Go to the CALCS tab and change the "Set Report" section to include the CF-1R and CF-2R forms. The "print" section needs to say either "yes" or "if complies." If you select "yes," the CF-2R form will print whether the run complies or not. If you select "if complies," the CF-1R and CF-2R forms print only if the run complies with the energy budget. Press Alt-G to run the calculation. Printing should occur automatically when the calculation finishes. If it does not print, check the completeness of the file and/or the printer settings and try again. If you continue to have problems printing, please contact the Energy Commission's Hotline at 1-800-772-3300.



What versions of compliance documentation are now acceptable and when did they take effect?



In the months following the adoption of the 2001 Standards, several versions of compliance software were approved for use with the new standards. Several of these versions were decertified, but were allowed for use before January 1, 2002. The following guidance indicates how to treat compliance documentation and specifies currently approved software.

- Beginning January 1, 2002, old compliance documentation from 1998 Standards on file at building departments is no longer acceptable. For buildings not yet permitted by this date, the documentation must be resubmitted using currently approved software and fully comply with the 2001 Standards.

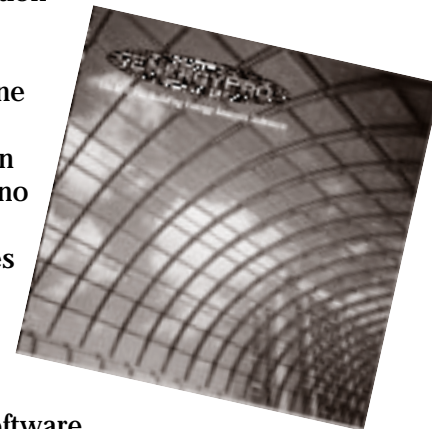
- Beginning January 1, 2002, no new compliance documentation may be submitted with MICROPAS6 v6.00 or EnergyPro 3.0. Only compliance

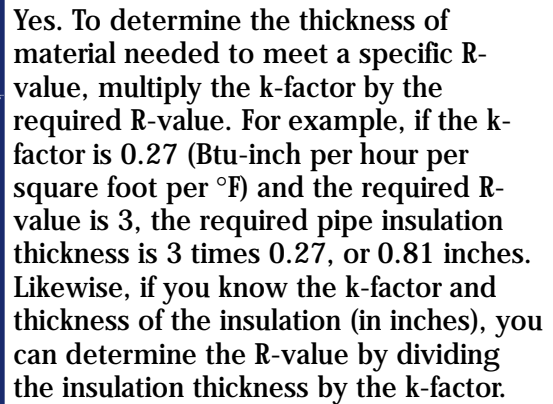
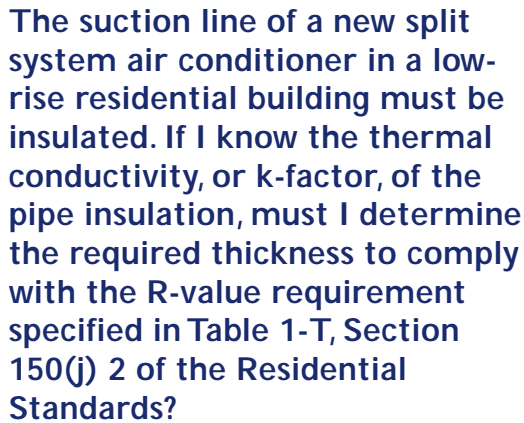
documentation from currently approved programs may be submitted after this date.

- Existing compliance documentation using the Multiple Orientation

Alternative with MICROPAS6 v6.00 or EnergyPro 3.0 after June 1, 2001 and before January 1, 2002 remain acceptable as long as no changes are made to energy-related features of buildings covered by that compliance documentation.

Currently approved software includes MICROPAS6 v6.01, EnergyPro 3.1 and CALRES2 v.1.4.





The California Energy Commission announces that 28 streaming video segments ranging from 3 to 8 minutes are now online at: www.consumerenergycenter.org/videos. These videos show how to inspect for the energy code, how to install the energy efficient devices or systems, and delineate the benefits of complying with the code. Also included is accompanying text on Frequently Asked Questions (FAQ's), Benefits, Relevant Standard (with links to the *Residential Manual* and *Standards*), Resources, and a link to contact the Energy Commission. Please take a look at these videos and tell us what you think! The Energy Commission has just approved a new contract to produce an additional 45 segments on the *2001 Energy Efficiency Standards for Residential and Nonresidential Buildings*.



Duct Sealing

The following is a special section of Q's and A's

☐ TXVs, readily accessible (climate zones 2 and 8-15 only)
(Installer testing and certification and HERS Rater or field verification required)

☐ Refrigerant Charge/Air Flow (climate zones 2 and 8-15 only)
(Installer testing and certification and HERS Rater or field verification required)

OR

☐ Alternative to Sealed Ducts and TXVs (see Package C or D Alternative Package Features for Project Climate Zone)

Climate Zone	Window SHGC	Window U-Factor	SEER	Heating

WATER HEATING SYSTEMS

Water Heater Type	Distribution Type	Number in System	Rated ¹ Input (kW or Btu/hr)	Tank Capacity (gallons)	Energy ¹ Factor or Recovery Efficiency	Standby ¹ Loss (%)	External Tank Insulation R-Value

1. For small gas storage water heaters (rated inputs of less than or equal to 75,000 Btu/hr), electric resistance, and heat pump water heaters, list Energy Factor. For large gas storage water heaters (rated input of greater than 75,000 Btu/hr), list Rated Input, Recovery Efficiency and Standby Loss. For instantaneous gas water heaters, list rated input and recovery efficiencies.

SPECIAL FEATURES (add extra sheets if necessary). **Package C and D: TXVs, Sealed Ducts, Radiant Barriers** (see installation requirements for radiant barriers in Section 8.13 of the 2001 Residential Manual).
Package C: thermal mass (thermal mass type, covering, thickness, and description).

Compliance Forms

August 2001

A-3

As a plan checker, can I tell if credit has been taken for "tight ducts" or "sealed ducts" and if the HERS rater verification is required?

Yes. Look on the CF-1R under "Special Features, Remarks and Notes" and/or "Field Verification and Diagnostic Testing Required." If credit has been taken for sealed ducts, it will be shown there.

Is there an easy way to find a certified HERS rater?

Yes. You can find a certified HERS rater on the Internet at http://www.cheers.org/cheers_rater.php or by calling 1-800-4 CHEERS (1-800-424-3377).

If I am building a house in a city that requires outside air to be mechanically provided, could this impact whether or not I can take credit for sealed ducts?

Yes. If the outside air is provided by attaching a duct to the outside to the space conditioning duct system, it

probably will be difficult to meet the "sealed duct" maximum leakage requirement. You may not seal off the outside air portion of the system during the "sealed duct" test. It may be possible for the outside air duct to have a damper and pass the test, but the damper would have to allow very little leakage. The "sealed duct" test must be made with the damper in its default position, and the system must pass all the requirements for the sealed ducts test. See the *Residential Manual*, Chapter 4 for specific duct testing requirements.

Another solution to provide the outside air would be to use mechanical ventilation that is completely separate from the space conditioning system. In most cases, separate mechanical ventilation would use a much smaller fan to provide the ventilation and would use considerably less fan energy. Also see our "Ventilation Protocol" at:

http://www.energy.ca.gov/efficiency/qualityhomes/mechanical_ventilation.html



If a single family house has two separate space conditioning systems, do both systems have to be tested by the HERS rater if the “sealed duct” credit is taken?



Yes. The HERS rater must test both systems if credit is claimed for duct sealing in the Performance Method or to comply with the Prescriptive Compliance Method.



When considering duct leakage, are ducts located between floors considered to be located inside conditioned space for conduction purposes?



Yes. The portion of the ducts located between floors is considered to have no conduction losses. However, as explained in the following question and answer, duct leakage is considered to be to the outside.



In multifamily and single family residences, does the HERS rater have to verify the duct leakage to get full credit for ducts in conditioned space?



Yes. If duct leakage is not tested, then ducts are assumed to be at the high leakage point for modeling whether or not the ducts are located in conditioned space. This requirement applies to single and multifamily buildings. The reasoning behind the requirement is that leakage pathways tend to lead to outside the building envelope, even when ducts appear to be physically located inside the conditioned space. Only testing of duct leakage can assure this is minimized. Also see the *Residential Manual*, Section 8, page 8-4.



When insulation is installed on top of the ducts in the attic, are the ducts in conditioned space?



No. It is not acceptable to place attic insulation on top of the attic ducts and then claim credit for ducts in conditioned space. The ducts must be inside the building envelope, which must be well sealed to prevent infiltration. The proper order is: living space, ducts, building envelope, and insulation.



Do I have to meet the duct sealing and TXV requirements for an addition under 100 square feet if I am using the Prescriptive Compliance Approach?



No. If the addition is less than 100 square feet, then you are exempt from the duct sealing and TXV requirements.



For an addition over 100 square feet, if I am installing a new air conditioner and using the Prescriptive Compliance Approach, do I have to meet the duct sealing and TXV requirements or the Alternative to Package D requirements?

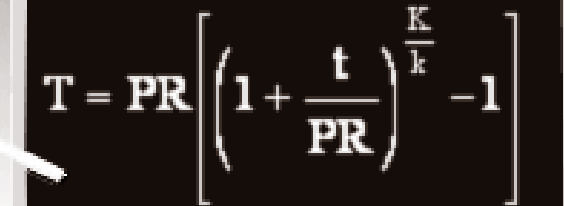


Yes. If the addition is over 100 square feet, then you have the choice of meeting the duct sealing requirements or using the Alternative to Package D requirements (see Table 3-2, page 3-3 of the *Residential Manual*). The requirements for testing refrigerant charge and air flow (or installing a TXV) apply only if a new split system air conditioner or heat pump is installed as part of the addition. If a separate air distribution system is installed for the addition, then this new

system must be tested and sealed to have a leakage less than or equal to 6 percent of the fan airflow. If an existing air distribution system is extended to serve the addition, this too must be tested, but the tested target duct leakage depends on the size of the addition and other factors discussed in the *Residential Manual*, Section 7.2.3, *Determining the Target Percent Leakage*. In lieu of testing duct leakage, refrigerant charge and airflow (or installing and verifying a TXV), the builder can choose to meet the Alternative to Package D requirements. See Table 3-2 in the *Residential Manual*. Note that Radiant Barriers are required in some climate zones when using the prescriptive packages.

Building Code published by the ICBO.

The correct equation is:



$$T = PR \left[\left(1 + \frac{t}{PR} \right)^{\frac{K}{k}} - 1 \right]$$

EQUATION 1-A—INSULATION THICKNESS EQUATION

WHERE:

T = Minimum insulation thickness for material with conductivity K , inches.

PR = Pipe actual outside radius, inches.

t = Insulation thickness from Table 1-G, inches.

K = Conductivity of alternate material at the mean rating temperature indicated in Table 1-G for the applicable fluid temperature range, in Btu-inch per hour per square foot per °F.

k = The lower value of the conductivity range listed in Table 1-G for the applicable fluid temperature range, Btu-inch per hour per square foot per °F.

NONRESIDENTIAL



Do occupancy sensor devices have to be certified, and if so, how can I tell if they are certified?



Yes. You may use occupancy sensors only if their manufacturers have certified to the Energy Commission that their products meet the requirements of Section 119 of the Standards. To determine if they are certified, contact the Energy Commission Hotline at 1 (800) 772-3300.



Is equation 1A for adjusting the thickness of pipe insulation in Section 123 of the *Nonresidential Building Efficiency Standards* publication number P400-01-024 correct?



No. There is a typographical error in this publication that also occurred in the publication of the 1998 Standards. The equation is correctly expressed in the Commission's 1998 and upcoming 2001 *Nonresidential Manual* and the *California*

Special Thanks:

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Training Now Available

Utilities Offering Title 24 Energy Training

Some utilities are currently offering training on issues relating to the AB970 2001 Energy Efficiency Standards for Residential and Nonresidential Buildings (Title 24 Energy Code). Details are available at the following websites:

For PG&E

http://www.pge.com/003_save_energy/003c3_stockton.shtml

For SoCal Gas and SDG&E

http://www.socalgas.com/business/resource_center/erc_seminar_info.shtml

For more information, contact John Eash of the Energy Commission at jeash@energy.state.ca.us

Did You Know?

- ▼ Work has started on the 2005 Building Energy Efficiency Standards. For more information on changes being considered, go to the following website:

http://www.energy.ca.gov/2005_standards/index.html

- ▼ The California Legislature has directed the Energy Commission to adopt energy standards for outdoor lighting. The Energy Commission intends to develop and adopt lighting standards for all outdoor lighting applications. Those portions of the standards that are adopted in Title 24 are expected to go into effect in 2005 with the next triennial update of the California Building Code. The Energy Commission has established a proceeding to identify, discuss, and evaluate measures that would be incorporated into the 2005 Outdoor Lighting Standards. Details about the outdoor lighting proceeding are available on the Energy Commission website at the following address:

http://www.energy.ca.gov/outdoor_lighting/

- ▼ Energy Fact Sheets are available on the web. The U.S. Department of Energy website has fact sheets and brochures on energy topics including Air Sealing, Ceilings and Attics, Crawlspace Insulation, Energy Efficiency Pays, Passive Solar Design, Improving the Efficiency of Your Duct System, Slab Insulation, Wall Insulation, Weather-Resistive Barriers, and Whole House Fans. Visit <http://www.eren.doe.gov/buildings/documents>. The sketches of construction details are excellent.

Corrections

A correction to the answer from Blueprint #66's first question regarding conflict of interest requirements for HERS raters: A "three party contract" is only acceptable if 100 percent of the homes are tested (i.e. this approach cannot be used when sampling is done). Also, increased HERS monitoring is needed, and the rater needs to check the air flow of the system to make sure the duct system is unobstructed and unaltered. In addition, the raters must use their own equipment not the contractor's testing equipment.

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Efficiency Standards Office
1516 Ninth Street, MS-25
Sacramento, CA 95814-5512
(916) 654-4064

John Eash
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For any questions or additional information relating to the new
Standards contact the Energy Hotline at (800) 772-3300.

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